

AMENDMENTS TO THE CLAIMS:

Amend the claims as follows:

Claims 1-66. (Canceled)

67. (new) A recombinant protein (a) having luciferase activity, (b) having at least 90% similarity to wild-type luciferase from *Photinus pyralis* (SEQ ID NO: 37), and (c) being a mutated wild-type sequence wherein in the sequence of the recombinant protein, at least one of

(a) the amino acid residue corresponding to residue 214 in *Photinus pyralis* luciferase;

(b) the amino acid residue corresponding to residue 232 in *Photinus pyralis* luciferase;

(c) the amino acid residue corresponding to residue 295 in *Photinus pyralis* luciferase;

(d) the amino acid residue corresponding to amino acid 14 of the *Photinus pyralis* luciferase;

(e) the amino acid residue corresponding to amino acid 35 of the *Photinus pyralis* luciferase;

(f) the amino acid residue corresponding to amino acid residue 105 of the *Photinus pyralis* luciferase;

(g) the amino acid residue corresponding to amino acid residue 234 of the *Photinus pyralis* luciferase;

(h) the amino acid residue corresponding to amino acid residue 420 of the *Photinus pyralis* luciferase;

(i) the amino acid residue corresponding to amino acid residue 310 of the *Photinus pyralis* luciferase

is different to the amino acid which appears in the corresponding wild-type sequence of *Photinus pyralis* luciferase and wherein the protein has increased thermostability as compared to an enzyme having the amino acid of the corresponding wild-type luciferase at this position.

68. (new) A protein according to claim 67 which has the sequence of the *Photinus pyralis* wild-type luciferase except that more than one amino acid residue is different to that of the wild-type luciferase.

69. (new) A protein according to claim 68 wherein up to 50 amino acids are different to that of the wild-type luciferase.

70. (new) A protein according to claim 67 which is a modified form of luciferase of *Photinus pyralis*.

71. (new) A protein according to claim 67 comprising a protein having luciferase activity and at least 90% similarity to wild-type luciferase from *Photinus pyralis* (SEQ ID NO: 37) wherein in the sequence of the protein, at least one of

(a) the amino acid residue corresponding to residue 214 in *Photinus pyralis* luciferase is mutated and is other than threonine; or

(b) the amino acid residue corresponding to residue 232 in *Photinus pyralis*

luciferase is mutated and is other than isoleucine; or

(c) the amino acid residue corresponding to residue 295 in *photinus pyralis*

luciferase is mutated and is other than phenylalanine;

and the protein has increased thermostability as compared to *Photinus pyralis*

luciferase, on which the protein is based.

72. (new) A protein according to claim 67 wherein the amino acid residue corresponding to residue 214 in *Photinus pyralis* luciferase is alanine.

73. (new) A nucleic acid which encodes a protein according to claim 67.

74. (new) A vector comprising a nucleic acid according to claim 73.

75. (new) A cell transformed with a vector according to claim 74.

76. (new) A cell according to claim 75 which is a prokaryotic cell.

77. (new) A cell according to claim 75 which is a plant cell.

78. (new) A plant comprising cells according to claim 77.

79. (new) In a bioluminescent assay which comprises a luciferase/luciferin reaction and detection of bioluminescence, an improvement comprising contacting the

protein according to claim 67 in said reaction.

80. (new) A kit comprising a protein according to claim 67.

81. (new) A kit according to claim 80 which further comprises luciferin.

82. (new) A recombinant protein (a) having luciferase activity, (b) having an amino acid sequence having at least 90% similarity to the amino acid sequence of wild-type *Photinus pyralis* luciferase (SEQ ID NO: 37) and (c) being a mutated wild-type sequence; wherein, in the sequence of the recombinant protein, the amino acid residue corresponding to residue 214 in *Photinus pyralis* luciferase is mutated as compared to the corresponding wild-type luciferase, such that the recombinant protein has enhanced thermostability as compared to the corresponding wild-type luciferase.

83. (new) A nucleic acid which encodes a recombinant luciferase according to claim 82.

84. (new) The nucleic acid of claim 83 in a vector.

85. (new) The vector of claim 84 transformed in a cell.